

CLAIMS

What is claimed is:

1. A process for the manufacture of 1,1,1,3,3,3-hexafluoropropane and at least one compound selected from the group consisting of
5 1,1,1,2,3,3-hexafluoropropane and 1,1,1,2,3,3,3-heptafluoropropane, comprising:
 - 10 (a) reacting HF, Cl₂, and at least one halopropene of the formula CX₃CCl=CX₂, wherein each X is independently selected from the group consisting of F and Cl, to produce a product comprising CF₃CCl₂CF₃ and CF₃CClFCClF₂, wherein said CF₃CCl₂CF₃ and CF₃CClFCClF₂ are produced in the presence of a chlorofluorination catalyst comprising at least one composition selected from the group consisting of (i) compositions comprising ZnCr₂O₄
15 and crystalline α-chromium oxide, (ii) compositions comprising a zinc halide and α-chromium oxide and (iii) compositions of (i) or (ii) which have been treated with a fluorinating agent;
 - 20 (b) reacting CF₃CCl₂CF₃ and CF₃CClFCClF₂ produced in (a) with hydrogen, optionally in the presence of HF, to produce a product comprising CF₃CH₂CF₃ and at least one compound selected from the group consisting of CHF₂CHF₂CF₃, and CF₃CHF₂CF₃; and
 - 25 (c) recovering from the product produced in (b), CF₃CH₂CF₃ and at least one compound selected from the group consisting of CHF₂CHF₂CF₃ and CF₃CHF₂CF₃.
2. The process of Claim 1 wherein the halopropene reactant is contacted with Cl₂ and HF in a pre-reactor.
3. The process of Claim 1 wherein the halopropene reactant is
30 contacted with HF in a pre-reactor.
4. The process of Claim 1 wherein the reaction of (b) is conducted in a reaction zone which is unpacked or packed with a nickel alloy at a temperature of from about 350°C to about 600°C.
5. The process of Claim 1 wherein the reaction of (b) is conducted
35 in a reaction zone containing a hydrogenation catalyst at a temperature of from about 100°C to about 350°C.
6. The process of Claim 1 wherein in (a) the catalyst is selected from the group consisting of (i) compositions comprising ZnCr₂O₄ and

crystalline α -chromium oxide and (iii) compositions of (i) which have been treated with a fluorinating agent.

7. The process of Claim 6 wherein the amount of zinc relative to the total of chromium and zinc in the catalyst composition is from about 1
5 atom % to about 25 atom %.

8. The process of Claim 6 wherein the catalyst is selected from the group consisting of (i) compositions comprising ZnCr_2O_4 and crystalline α -chromium oxide wherein the ZnCr_2O_4 contains between
10 about 10 atom percent and 67 atom percent of the chromium in the composition and at least about 70 atom percent of the zinc in the composition, and wherein at least about 90 atom percent of the chromium present as chromium oxide in the composition is present as ZnCr_2O_4 or crystalline α -chromium oxide and (iii) compositions of (i) which have been treated with a fluorinating agent.

15 9. The process of Claim 1 wherein in (a) the catalyst is selected from the group consisting of (ii) compositions comprising a zinc halide and α -chromium oxide and (iii) compositions of (ii) which have been treated with a fluorinating agent.

10 10. The process of Claim 9 wherein the amount of zinc relative to the total of chromium and zinc in the catalyst composition is from about 0.1 atom % to about 25 atom %.

25 11. The process of Claim 9 wherein the catalyst is selected from the group consisting of (ii) compositions wherein a zinc halide is supported on a support comprising α -chromium oxide and (iii) compositions of (ii) which have been treated with a fluorinating agent; and wherein the amount of zinc relative to the total of chromium and zinc in the catalyst composition is from about 2 atom % to about 10 atom %.